

# **Neuropsychological Examination Techniques in Inclusive Education: Research of Difficulties of Training in Reading and Writing**

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One of the priorities of the implementation of inclusive education in Russia is not only a successful socialization of persons with disabilities, but also their effective learning. In this paper we have considered one of the categories of persons with disabilities – that is children with ADHD with speech disorders. The reference to this problem is due to emerging challenges in the learning process of this category of children in educational institutions. They belong to the risk group as for the possibility of their difficulties in writing when in the learning process at educational institutions. The analysis of investigations allowed revealing the contradictions between the need to implement actual courses of innovative development for educational institutions, which are the drive lines developing innovative approaches and practical measures for the implementation of inclusive education, and their underdevelopment. Secondly, there is the contradiction between the need for innovating the content of not only educational process as such, but also of the correctional and developmental education of persons with disabilities. Thirdly, the role of alternative forms of inclusive education has not been studied, neither of the special services and centers in the implementation of psycho-pedagogical support of persons with disabilities.

**Keywords:** emotional intelligence, emotional quotient, academic success, second language learning, career development

## **INTRODUCTION**

At the present stage in Russia a new integration approach of solving problems of persons with disabilities is being implemented. To this end, all the levels of Russian education are being upgraded. This process involves, firstly, the introduction of the actual courses of the educational institutions' innovative development, which are

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the drive lines developing innovative approaches and practical measures for the implementation of inclusive education. Secondly, it involves the content innovation of not only the educational process (Kalimullin, 2014), but also of the correctional and developmental education of persons with disabilities.

In this paper we have considered one of the categories of persons with disabilities – that is ADHD children with speech disorders. They belong to the risk group as for the possibility of their reading and writing disorders in the learning process at educational institutions. The analysis of modern researches on this problem has shown that the reasons of these difficulties are not only speech disorders, but also abnormalities in the development of higher mental functions.

Today one of the most pressing and difficult problems of successful teaching ADHD children in terms of inclusion is to find effective methods for overcoming the difficulties of learning to read and write. As practice shows, currently one of the most innovative and effective ways of inclusive education is the neuropsychological approach. However, in the modern literature only the role of neuropsychological techniques is indicated in diagnosis, prevention and correction of reading and writing disorders of ADHD children with speech disorders of senior preschool and younger school age. In this regard, the problem of using the neuropsychological methods in the system of inclusive education is relevant.

## A theoretical research analysis

There is currently grounded theory of systemic dynamic localization of higher mental functions and neuropsychological approach to the analysis of their disorders (Vygotsky, 1982; Luria, 1969; Glozman, 2009; Korsakova, Mikadze & Balashova, 2001; Semenovich, 2002; Tsvetkova & Tsvetkov, 2009; Levchenko, 2000; Frost, Moffitt & McGee, 1989), issues on neuropsychological approach in inclusive education are addressed (Akhutina, 2008; Pylaeva, 2008; Nigmatullina, 2015a,b).

In modern science there is a body of knowledge necessary for formulating solutions to the problem: the idea of studying language development on the interdisciplinary level is justified (Zvegintsev, 1973; Lvov, 2000, Fedorenko, 1984); problems of verbal communication are revealed (Kan Kalik, 1995; Leontiev, 1969; Potebnya, 1993); the problems of speech communication are examined (Artemov, 1976, Arutyunova, 1998); general trends of high school students' speech development are established (Bozhovich, Slavina & Endovitskaya, 1976; Halperin, 1978; Spirova, 1980; Skvortsov, 1980, 2010); possible ways of formation of high school students' linguistic competence are identified (Bozhovich, 1976; Vinokur, 1993; Zimnyaya, 2004); problems of the organization and content of inclusive education of children with disabilities are identified (Alyokhina&Semago, 2012; Akhmetzyanova, 2015; Fajzrahmanova, 2015; Kirillova, 2015; Malofeyev, 1996; Nigmatov, 2014; Nigmatullina, 2015).

T. V. Akhutina (2010), O. B. Inshakova (2013), L. S. Tsvetkova (2009), A. V. Semenovich (2002) write that a child with intact hearing, vision and intelligence can write illiterately because of the immaturity of the various parts of the brain due to the disorder of any of the functional writing components: operations for processing auditory, kinesthetic, visual and visual-spatial information; the serial organization of movements and speech, programming and monitoring the activities, selective activation.

T. V. Akhutina (2010), L. S. Tsvetkova (2009), A. V. Semenovich (2002) point out the writing features of high school students with disorders in information processing by the left hemisphere. The predominant errors in writing are a mixture of letters denoting the sounds similar in acoustic and articulatory characteristics: paired voiced and voiceless, soft and hard consonants, sibilants and sibilant, affricates and their components. The basis of such errors is lack of the phonemic

perception formation. The left hemisphere gnostic disorders affect the condition of all the speech components. N. N. Polonskaya, L. V. Yablokova & T. B. Akhutina (1999) emphasize the presence of sound pronunciation defects and sound-syllabic structure distortions of complex words.

A number of authors indicate the errors of inertia type. T. B. Akhutina (2010), N. K. Korsakova, Y. V. Mikadze & E. Y. Balashova, (2001), A. V. Semenovich (2002) refer to them the preservatives of letter elements, letters, syllables, which are due to the inability to stop the started motion in time. T. B. Akhutina (2010) identifies errors associated with the simplification of motor programs – missing letters and syllables. In the writing under dictation, and even when copying, students with the regulatory challenges have a large number of errors when indicating the sentence boundaries, as well as the errors indicating word boundaries.

Thus, the analysis of the scientific research allowed us to assume that children of 6-7 years with general speech impairments have disorders that will later lead to significant difficulties in mastering high school literacy that is of primary concern for written language. One of the causes of those disorders may be the presence of Attention Deficit Hyperactivity Disorder (ADHD).

### **Attention deficit/ hyperactivity disorder (ADHD): a review of the recent research**

Currently there have been accumulated a lot of clinical data on ADHD prevalence, main symptoms, types and subtypes of this syndrome, the development features of cognitive, emotional and motivational spheres, the morphological structure specifics of the cerebral cortex, neurophysiologic changes observed in this type of disorders. In ICD-10 ADHD (1994) is presented in the section "Behavioral and emotional disorders starting in childhood and adolescence" and is categorized as hyperkinetic disorders (F90 rubric), and in DSM-IV-TR ADHD is shown in rubric 314 of the section "Disorders first diagnosed in infancy, childhood or adolescence" (2000). According to ICD-10, the principal symptoms of this disorder are attention deficit, hyperactivity and impulsiveness.

The DSM-IV-TR classification defines ADHD as a primary disorder. At the same time, the following forms of ADHD are differentiated depending on the prevailing symptoms: combined form where all three groups of symptoms are present (50-75%); ADHD predominantly inattentive type (20-30%); ADHD predominantly hyperactive-impulsive type (about 15%).

According to recent neuropsychological studies, the primary deficit of ADHD is the lack of functioning of the first and third structural and functional units of the brain. Foreign authors term this deficit as a failure of the activating system of the brain and regulatory functions. As A. R. Agris, O. I. Egorova, E. Y. Matveeva & A. A. Romanova note in their works (2012), the regulatory functions include regulation, planning and activity control. One important component is cognitive control and inhibition control. By the term "cognitive control," these authors imply the ability to resolve a conflict between competing stimuli or action patterns through the inhibition of irrelevant data and maintaining the processing of the relevant ones.

Thus, the ADHD children show cognitive, behavioral and communicative disorders, which is evident in their communicative activities.

### **MATERIALS AND METHODS**

In order to study and determine the indicators of reading and writing disorder occurrence in preschool children with ADHD who have a general speech underdevelopment, using the method of neuropsychological testing, and to identify the special educational needs in the process of further education in this category, we

have conducted an ascertaining experiment. In this experiment, 103 preschool children with ADHD took part who all had the diagnosis "general speech underdevelopment level 3" (GSU level 3). In carrying out the ascertaining experiment, we used the adapted technique of T.B. Akhutina and O.B. Inshakova named "Neuropsychological examination of children aged 6 to 9 years" (2013).

## RESULTS

According to the results of our research, 48 children have a malfunction of the energy unit, which comprises 46.6% of the total number of subjects.

During the experiment, the fluctuations of attention of the subjects, their exhaustion, their tendency to micro- and macrography, hypo- and hypertonicity was assessed, as well as the child's behavior and condition overall. When performing the tasks, the children coped poorly due to their restlessness and dystonia. Most of the children often proceeded with performing the tasks without hearing out the experimenter's instructions. As a result, numerous errors in the program assimilation were registered, which influenced their performance. It was particularly noticeable when performing motion exercises and when counting with the Schulte tables.

Thus, we can draw a conclusion that the disorders of brain block 1 structures in subjects is accompanied by disorders of the dynamic characteristics of activity, such as reduced performance and rapid exhaustion.

In the study, we have identified writing disorders related to the disorder of the second functional unit (which is responsible for receiving, processing and storage of information) in 28 children, which is 27.1% of the total number of subjects.

Thus, the children having disorders of the brain block 2 showed errors conditioned by impaired phonemic perception, which resulted in children confusing sounds and showing a trend towards consistent retrography and visuospatial difficulties in writing, as well as to kinesthetic, auditory and speech difficulties when reading.

In our research, we have found 27 people with impaired unit of programming, regulation and activity control, which accounted for 26.3% of the total number of subjects. Of these, 15 people had disorders of serial motor and action organization (14.6%) and 12 people had disorders of programming and voluntary action control (11.7%).

We have found out that most of the subjects showed preconditions of writing disorders caused by regulatory difficulties. The underdevelopment of the serial motor acts organization is reflected in writing by difficulties in smooth, automated performance of the motor series.

The analysis of the experiment's data showed that the difficulties in the serial motor acts organization affect almost all the levels of oral speech in senior preschool children with GSU level 3: articulatory, syntactic and semantic. When pronouncing the words there were distortions of the syllabic structure, namely missing and displaced syllables and sometimes sounds. When constructing sentences children made some particular grammatical mistakes: the use of nouns in the nominative or verbs in the infinitive; the children's independent speech was dominated by simple sentences; there were difficulties constructing an expanded narrative, inconsistent account of events, frequent omissions of significant parts of text. The children are unable to organize their activities in accordance with external instructions or internal self-instruction.

Thus, the underdevelopment of the third functional brain block leads to disruption of the child's programming and voluntary action control.

Following the results of our neuropsychological testing, we concluded that the majority of senior preschool children with ADHD and speech disorders are ill-

prepared to learning how to read and write.

A qualitative analysis of the samples allowed us to identify weak links in the development of preschool ADHD children who have speech disorders, which subsequently may lead to difficulties at school, namely disorders of reading and writing.

Thus, each functional brain block makes its own specific contribution to the work of the system, and the disruption of at least one component leads to restructuring of the entire system, which in its turn is reflected in the processes of reading and writing.

## **DISCUSSION**

Among those engaged in the research on mental development of preschool children were N. I. Gutkina (2004), I. V. Dubrovina (2001), A. V. Zaporozhets, Y. Z Kozhushko (1965), M.I. Lisina (1986), V.I. Lubovsky (1989), B.C. Mukhina (1986), Z. I. Galimova & A. A. Tvardovskaya (2015). To the study of ADHD on the basis of analytical strategies devoted their works E. D. Belousova & M. Y. Nikanorova (2000), N. N. Zavadenko (2012), V. P. Kuchma & A. G. Platonova (1997), A. E. Tambiev, S. D. Medvedev & O. V. Litvinenko (2001), O. V. Khaletskaya & V. M. Troshin (1998), Y. S. Shevchenko (1997), and others. The issues of school alienation of ADHD children were researched by N. N. Zavadenko, N. G. Petruhin & N. G. Manelis (1999). The development problems of cognitive and volitional processes in preschool children were studied by A. V. Zaporozhets & Y. Z. Neverovich (1965), A. L. Sirotyuk (2002), and T. V. Artemyeva (2015). The study of the structure of the speech defect in the general speech underdevelopment was also carried out by such scholars as R.I. Lalayeva, N. V. Serebryakova & S. V. Zorina (2004), R. E. Levina (1975) and others. The issues of psychological, educational and neuropsychological diagnostics of developmental disorders are covered in the works of G. I. Zharenkova (1981), N. M. Pylayeva (1995), A. V. Semenovich (2002), Zh. M. Glozman (2009), L. S. Tsvetkova (2009), I. Y. Levchenko (2000), T. V. Akhutina (2010). Among the issued considered in modern foreign studies are: neuropsychological indicators of developmental disorders (Frost, Moffitt & McGee, 1989; Geeraerts, Deutz & Deković, 2015); ADHD phenomenon (Tarver, Daley & Sayal, 2015; Pauli-Pott, Mingebach & Becker, 2014; Berwid et al., 2014; Pritchard et al., 2014; Kwak, Jung & Kim, 2015); dysgraphia and dyslexia in children (Hoorn, Maathuis & Hadders-Algra, 2013; Houston et al., 2014); relationship between cognitive and motor activities of ADHD children (Roebers et al., 2014).

## **CONCLUSION**

As follows from this research, we have studied the particular qualities of mutual influence of communicative characteristics and ADHD in preschoolers who have speech disorders serving as indicators of difficulties in learning reading and writing skills in general education institutions. We have found out that the difficulties in serial motor acts organization affect almost all levels of oral speech in senior preschool children with GSU level 3: articulation, syntactic and semantic.

Senior preschool children with GSU level 3 showed errors associated with difficulties processing visual-spatial information. The children had difficulties in orientation on a sheet of paper; they also had metric errors and reversions.

In the study, we have found that the majority of subjects displayed adynamia, apathy, indifference, fluctuation of mental functions while performing the tasks; the children quickly got tired; by the end of the task the number of errors increased, and they became grosser.

The qualitative analysis of samples allowed us to identify the weak links that

need eliminating in the development of preschool children with GSU level 3, which subsequently may lead to difficulties at school, namely to reading and writing disorders.

Based on these data, we will develop a program of correctional work aimed at preventing reading and writing disorders in senior preschool children with GSU level 3 using neuropsychological methods.

## RECOMMENDATIONS

The results presented in this article are of a practical importance to speech pathologists, psychologists and teachers working with disabled children and their parents.

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